Types of Traffic Control Systems

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Overview

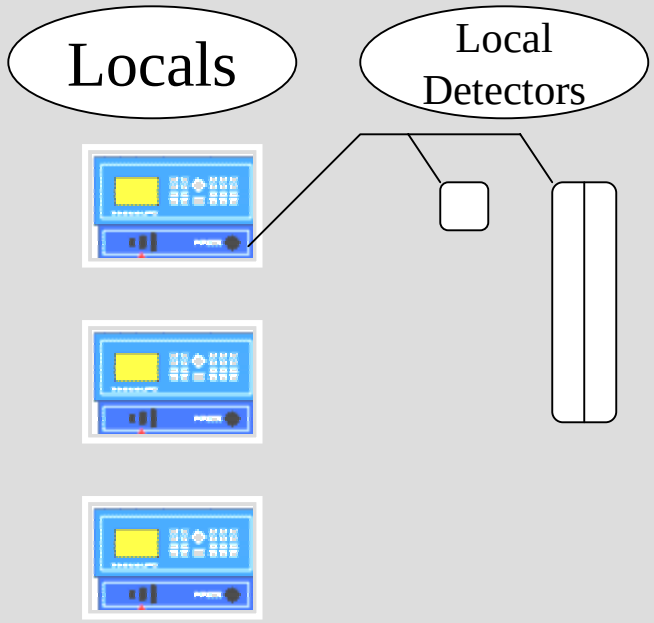
- Traffic Signal System Features
  - What can communicate with or within a system?
  - What controls how a system operates?
  - What coordination options are available?
- Design Considerations and Summary
  - What makes an effective system?
  - What are the benefits from a system?

Signal System Types

- Non-Interconnected
- Closed Loop
- Central

Non-Interconnected System

- Each local controller operates independently
  - Local Detectors are the only on-street monitoring device for each local controller and determine <u>where</u> demand is present



Non-Interconnected System

- Coordination Options
  - Time Based (predictable)
    - Time and date control the system regardless of demand
    - Predetermined timing plans (cycle lengths, offsets, splits)
    - Predetermined schedules (year, week, and day of week schedules)

Non-Inter Time Based System

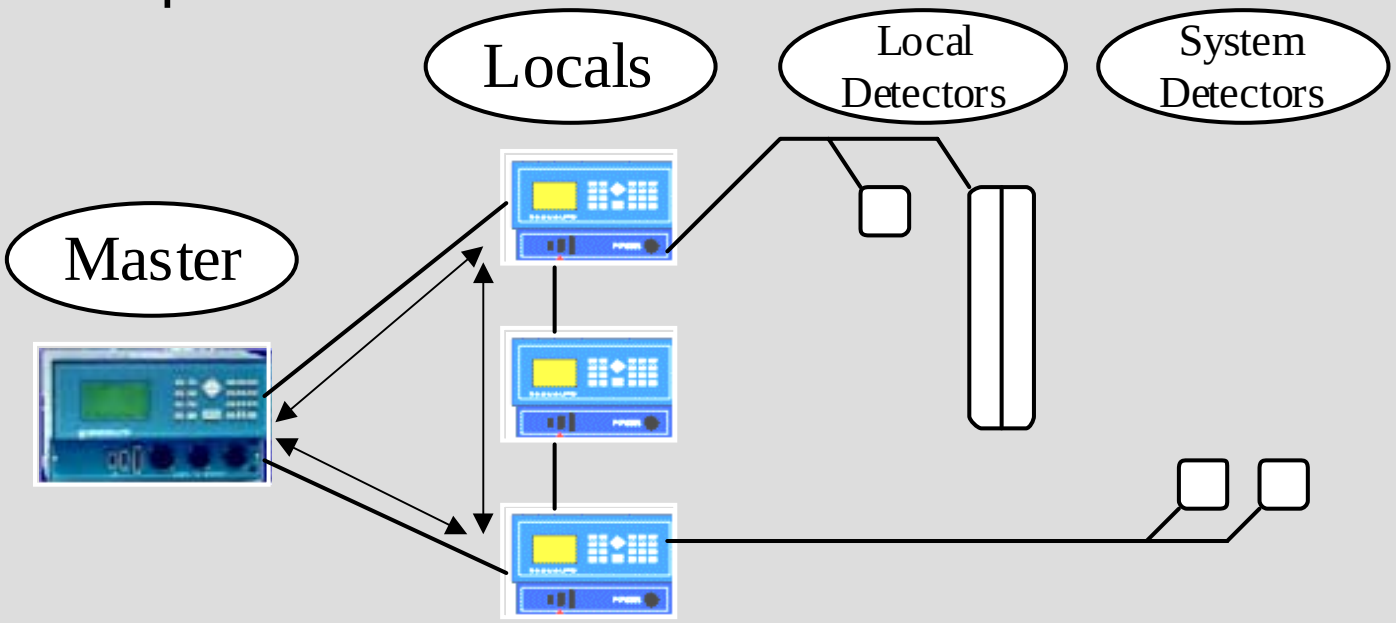
- Advantages
  - Versatile: Not vendor-specific
  - Simple: Basic coordination programming
  - Low Maintenance: No communication network
  - Low Cost: No additional equipment

Non-Inter Time Based System

- Disadvantages
  - Clock Maintenance: Must be done!
  - Updating: Timing plans and schedules must be updated as traffic volumes and patterns change
  - Travel: Required for any type of troubleshooting, evaluating, database management, etc…
  - Predefined Schedule: Incapable of responding to unusual traffic conditions

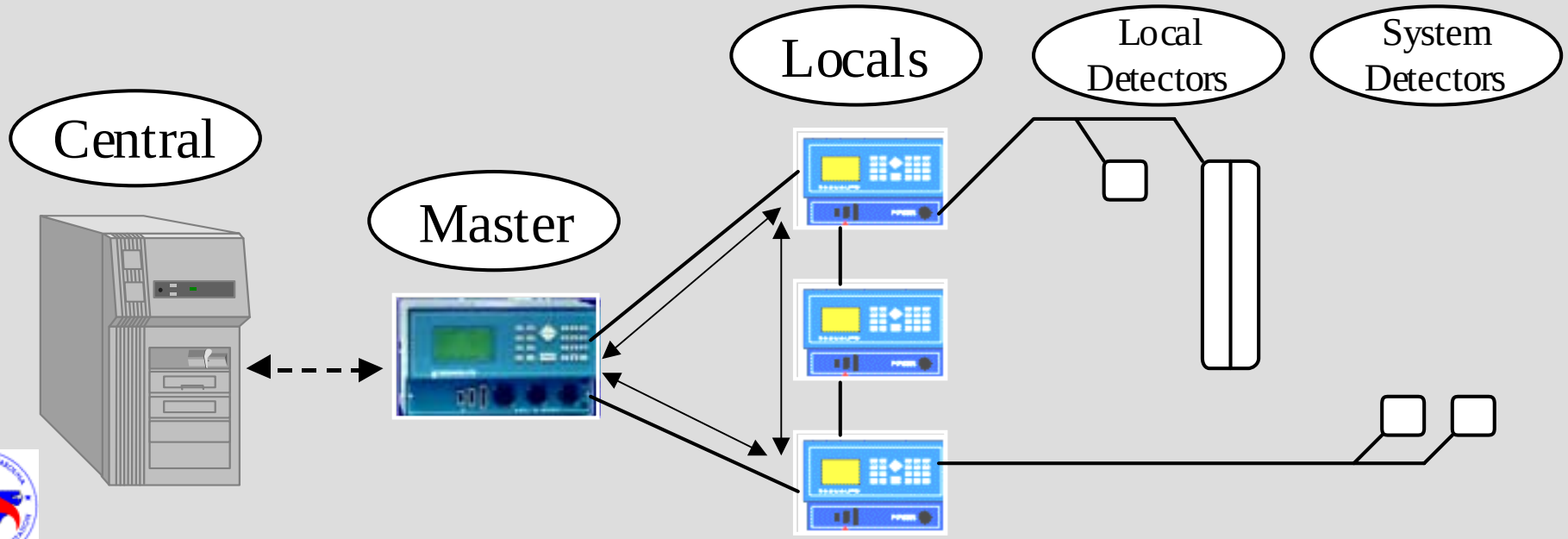
Closed Loop System

- A ‘master’ communicates with locals
  - Communication network typically consists of fiber optic cable or twisted pair wire
  - System Detectors are additional on-street monitoring devices and determine <u>what level</u> of demand is present



Closed Loop System

- Central can communicate with the system
  - Communication typically via modem and phone line, but is not required



Closed Loop System

- Coordination Options
  - Time Based (predictable)
    - Time and date control the system regardless of demand
    - Predetermined timing plans (cycle lengths, offsets, splits)
    - Predetermined schedules (year, week, and day of week schedules)
  - Traffic Responsive (variable)
    - System detectors control the system based on level of demand
    - Predetermined timing plans (cycle lengths, offsets, splits)
    - No schedule
    - Log records explain when and why a plan changed

Closed Loop System

- Coordination Options (continued)
  - Combinations (specific)
    - Traffic Responsive OVERRIDE: Schedule traffic responsive in the predetermined schedule
      - Time and date control the system*
      - Predetermined timing plans
      - Predetermined schedule
      - Run TOD when there is predictable volumes and patterns, then run TRP when volumes and patterns are not predictable

Closed Loop System

- Coordination Options (continued)
  - Combinations (specific)
    - Time of Day OVERRIDE: Schedule time based coordination, but allow traffic responsive to take over if demand is present
      - Time and date control the system*
      - Predetermined timing plans
      - Predetermined schedule
      - System will respond to higher levels of demand only

Closed Loop Systems

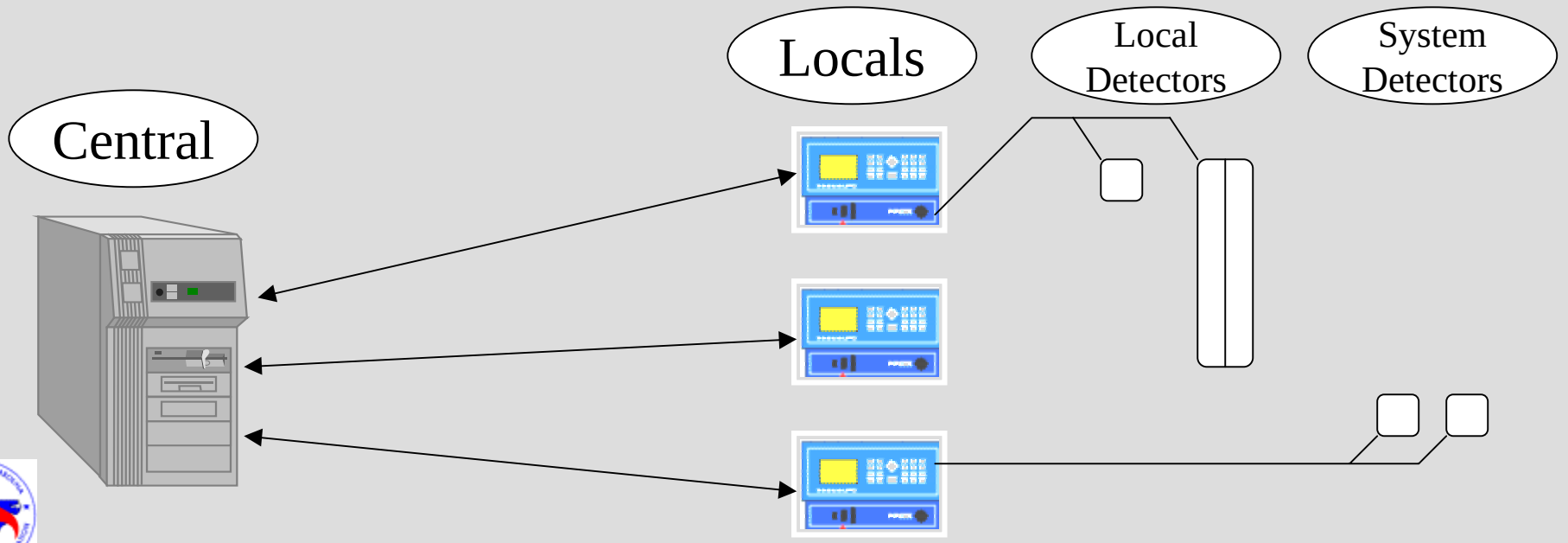
- Advantages
  - Clock Maintenance: Master maintains a ‘system’ time
  - System Maintenance: Remote access 24/7
  - Functional: Complexity is system/user specific
  - Shelf Life: Volume can grow into new plans
  - Data Collection: Detector and event logs are reference tools

Closed Loop Systems

- Disadvantages
  - Network Maintenance: Without communication, functionality is limited
  - Structured: Predefined systems might not coordinate well together
  - Confusing: Intricate systems have complex programming and logic
  - Overhaul: Vendor specific
  - Cost: Additional devices = Additional funds

Central System

- A central computer communicates directly with each local controller



Central System

- Coordination Options
  - Time Based (predictable)
  - Traffic Responsive (variable)
  - Combination (specific)

Central System

- Advantages
  - Flexibility: Locals can easily be moved in and out of systems as traffic patterns change
- Disadvantages
  - Bandwidth: Extensive communication network requires huge bandwidth capacity
  - Extensive Network: Direct line to each local
  - Cost: Same as usual…

Summary

- Non-Interconnected Systems
  - TBC (local clocks)
- Closed Loop Systems
  - TBC and TRP Coordination (system clock)
  - Remote Monitoring
  - Data Logging
- Central Systems
  - TBC and TRP Coordination (central clock)
  - Remote Monitoring
  - Data Logging
  - System Structure Control